SVP101AE Single-Channel All-In-One HD Video Capture Card User Manual V1.02

Solution

Application Note

Datasheet

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Version History

Version	Date	Add/Del/Rev
V1.00	2011-3-16	New version
V1.01	2012-2-11	Add audio equipment description explanation
V1.02	2012-6-18	Modify product manual according to the systech template format

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1 Preface

Thank you for purchasing SVP101AE HD video capture adapter!

The SVP101AE capture adapter is featured with small and exquisite bulk, superior performance and flexible characteristics. The SVP101AE capture adapter can capture one High-Definition video signal and one stereo analog audio signal. Video input can connect with SDI, HDMI, DVI, Component (YPbPr), VGA.

The user's guide will provide with necessary instruction for proper use of SVP101AE capture adapter.

2 Product introduction

2.1 Product Feature

- Capture one High-Definition or Standard-Definition video signal and one stereo analog audio signal.
- 1080p/60 Hz for HD signal input.
- HD signal can capture SDI, DVI, VGA, HDMI, Y/Pb/Pr.
- Capture LPCM audio signal via HDMI.
- Capture the embedded audio in SDI
- Microsoft AV Stream standard driver, support majority multimedia video software or streaming media software.
- Super small size: 96.24 mm x 92.76 mm.

[Attention]:

For copyright protection, you cannot use for capturing HD signal which blu-ray player outputs.

2.2 Advanced Feature

- DMA transmission with high performance.
- HD input can switch signal dynamically： SDI/DVI/HDMI/VGA/Y/Pb/Pr.
- The DVI-I interface is compatible with CVBS input.
- HD input supports automatic detection of input video format, automatic detection of the valid area of video and automatic detection of VGA capture phase.
- It supports manual settings for valid area of video which can be used to support the image clip and timing for special input signals
- HD input supports for multi-stage image zoom and provides with three scales for image aspect ratio.
- De-interlace supports Vertical Blend and Motion Adaptive.
- Hardware color conversion, it can output YUYV, UYUV, I420, RGB24，RGB32.
- HD input supports color adjustment, it can adjust image brightness, contrast, hue, saturation, Gamma; also R, G, B brightness and contrast can be adjusted separately.
- HD input supports image vertical flip and mirror.
- The firmware can upgrade.

2.3 Product Specifications

Connection	
Host Interface	PCI-Express x1, Low Profile, 200MB/s transmission bandwidth
Input Interface	1 DVI-I interface (can connect to HDMI, VGA, YPbPr)

	1 BNC interface (can connect to SD/HD/3G-SDI) 1 DB9 interface (to YPbPr, S-Video, CVBS,1 unbalanced stereo audio line in)
DVI Input	1 1080P/60Hz HD DVI signal
HDMI Input	1 1080P/60Hz HDMI signal
SDI Input	1 SD/HD3G-SDI signal, it can reach 1080P/60Hz
VGA Input	1 VGA
YPbPr Input	1 YPbPr
CVBS Input	1 SD video signal
HDMI Input	1 LPCM audio signal
SDI Input	1 embedded SDI audio
Analog audio	1 analog audio
Standard	
DVI Input formats	It meets DVI 1.0 standard, single connection (480i, 576i, 480p, 576p, 720p, 1080i, 1080p)
HDMI Input formats	It meets HDMI 1.3 standard, support 36 bits DeepColor
SDI Input formats	SD/HD/3G-SDI，it meets standards of SMPTE-259/274/296/372/424/425/292
YPbPr Input formats	480i、576i、480p，576p，720p，1080i，1080p
VGA Input formats	640x400—2048x1536 when the pixel is below 170MHz; provides safe mode for VGA signals and can capture irregular resolutions
CVBS Input standards	PAL/NTSC
HD Output format	40 x30-2048x1536, frame rate: 1-100fps
SD Output format	176x144-768x576, frame rate:1-30fps
Analog audio sampling rate and SNR	Up to 96 KHz, 85db, 24-bit
Video sampling rate	CVBS: 57.27MHz (4x Oversampling) RGB/component: 170MHz HDMI/DVI: 225MHz
Video sampling precision	128MB DDR2, 160 MHz of working frequency, 32bit of bit wide

YPbPr Input Mode	10 bits
Color Space	YUYV, UYUV, I420, RGB 24 bits, RGB 32 bits
HDMI Input Mode	Up to HDMI 1.3 standard, support 36bit Deep Color
Video Processing	
Color space switch	Hardware color switch
De-interlacing	Vertical filter de-interlacing; motion-adaptive de-interlacing
Image Scale	Hardware 5-Tap scale
Image Mirror	Horizontal; vertical
Image Clip	Yes
Image Adjustment	Brightness/contrast/hue adjustment/ saturation adjustment/control of monochrome and color/ Gamma adjustment separately adjust the brightness and contrast of R/G/B
Others	
Operating System Support	Support following operating systems (x 86 version or x64 version) : Windows® XP Professional Windows® Server 2003 Windows Vista®, Windows® Server 2008 Windows® 7 Windows® Server 2008 R2
Software Compatibility	Windows Media Encoder Adobe Flash Media Live Encoder Real Producer Plus VideoLAN for Windows
Onboard Memory	128MB DDR2, working rate is 160 Mhz, bit width is 32bits
Update	Firmware can be updated.
Size	96.24mm x 92.76mm

Power Consumption	<= 5W
Operating Temperature	0 to 50 deg C
Storage Temperature	-20 to 70 deg C
Relative Humidity	5% to 90%

Table 1 SVP101AE Single-Channel All-In-One HD Video-Capture Card Product Specifications

2.4 Standard Accessories

1. DVI-I breakouts to HDMI+ YPbPr 1
2. DVI-I adapter 1
3. DB9 to YPbPr+ CVBS+ S-Video+ Stereo audio cable 1

[Please note]:

1. PCI-Express actual transmission bandwidth relates with the host chipsets and motherboard, it may be lower than written value here.
2. The actual output frame rate is limited by PCI-Express interface bandwidth,it may be less than setting value.

3 Minimum Hardware Configuration

- Intel Core Solo
- 1G of RAM
- Available PCI-Express x1 expansion slot on mainboard

4 Recommended Hardware Configuration

- Intel Core i5

- 2G of RAM
- Available PCI-Express x1 expansion slot on motherboard

5 System Requirements

System should be one of the following systems (x 86 version or x64 version):

- Microsoft Windows XP
- Microsoft Windows Server 2003
- Microsoft Windows Vista
- Microsoft Windows Server 2008
- Microsoft Windows 7
- Microsoft Windows Server 2008 R2

6 Hardware and Driver Installation

Please contrast parts list and parts in package to confirm that there is no lack of any parts.

6.1 Parts List

Parts	Number
SVP101AE Capture Adapter	1
DVI-I breakout to HDMI + component signals	1
DVI-I adapter to VGA	1
DB9 to A/V Interface Breakout Cable	1
Driver Installation CD	1
Product Manual(the document)	1

Table 2 SVP101AE Single-Channel All-In-One HD Video-Capture Card Parts List

6.2 Install SVP101AE capture adapter:

1. Power off the computer.
2. Discharge any static electricity build up in your body by touching a large grounded metal surface or the computers' case (if plugged in) for few seconds; or wear an antistatic wrist strap.
3. Put SVP101AE capture adapter into the computer PCI-Express slot. The card can be putted into PCI Express x1, x4 or x16 slot.(Note: the x16 slot in some motherboard is exclusive use for graphics card, SVP101AE may be not identified correctly)
4. Power on the computer to start the operating system.
5. Cancel the "find new hardware" image that the operating system prompts.
6. Insert the driver CD-ROM and run Autorun.exe in CD-ROM root directory.
7. Click the installation program and follow prompts to carry on remaining operations.
8. Run"AmCap.exe" in CD to check whether it has been installed successfully after installation.

7 Connection of Video Input

7.1 SDI Signal

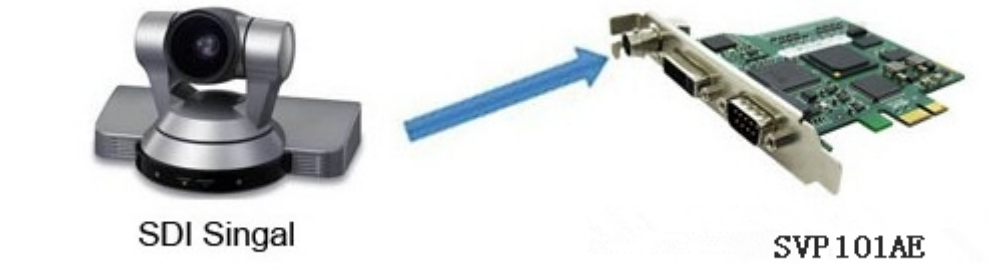


Figure 1, SDI signal connection sketch map

7.2 DVI-D/DVI-I Signal

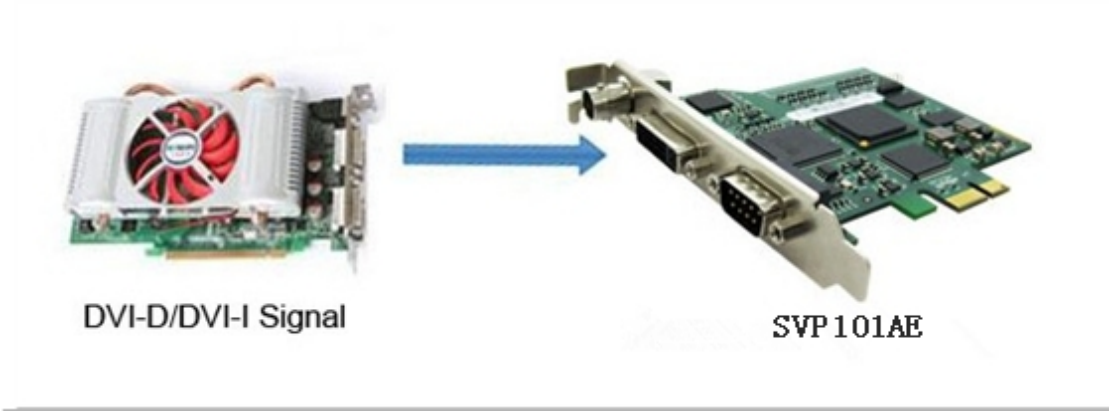


Figure 2, DVI signal connection sketch map

7.3 HDMI Signal

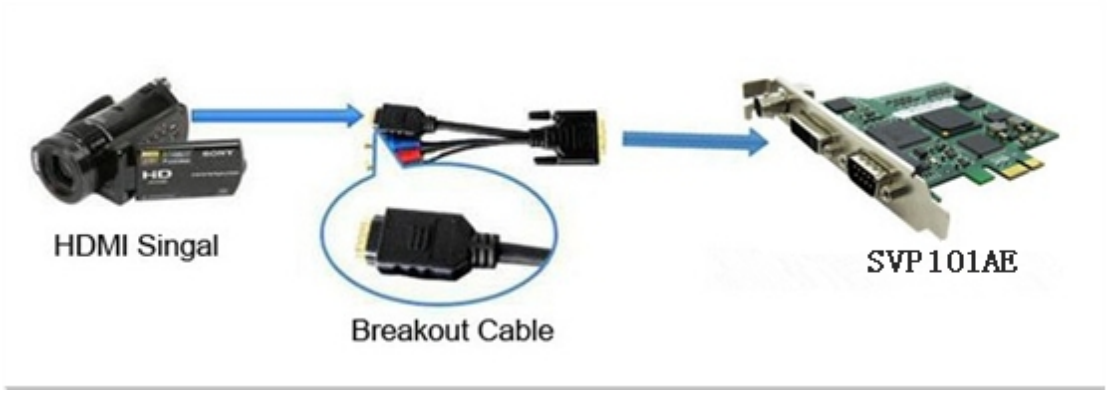


Figure 3, HDMI signal connection sketch map

7.4 VGA Signal(RGB-HV)

Figure 4, VGA signal connection sketch map

7.5 Component Signal(YPbPr)

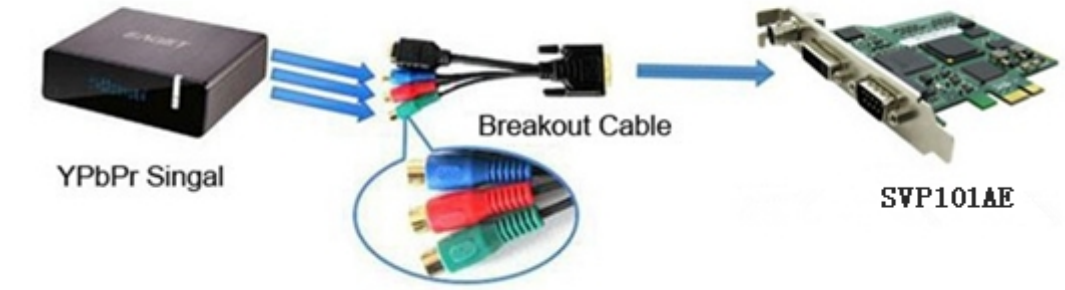


Figure 5, First component signal connection sketch map

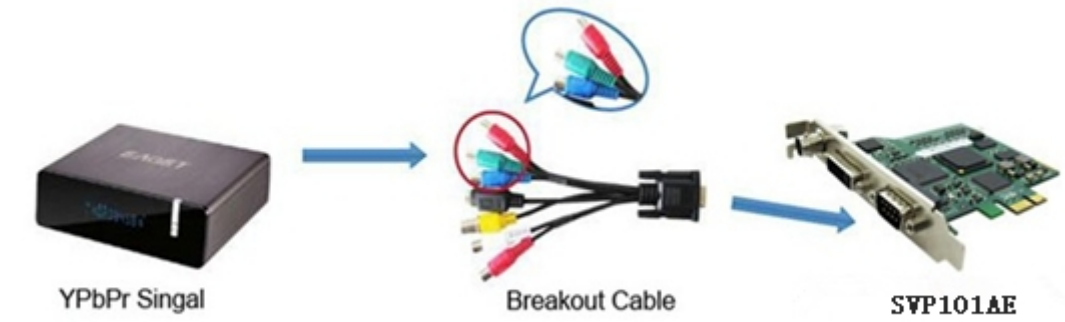


Figure 6, Second component signal connection sketch map

[Note]:

first component signal is select the input interface automatically;

second component signal is select the input interface manually.

7.6 Composite Video Broadcast Signal（CVBS）

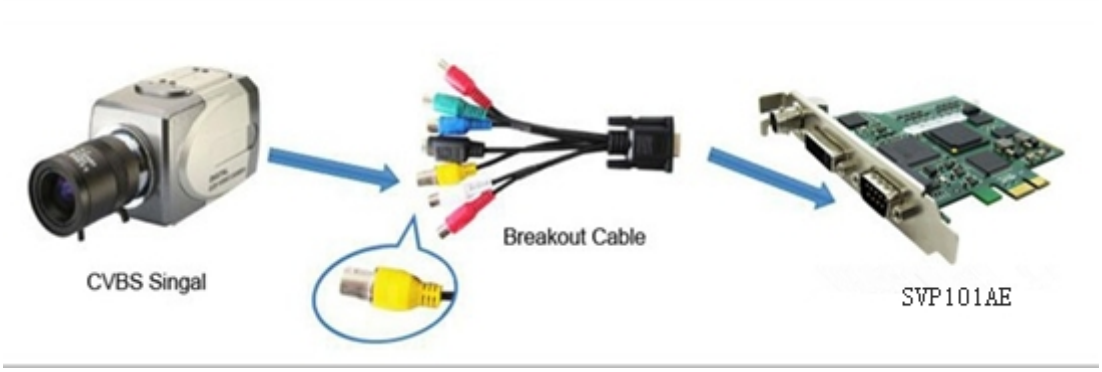


Figure 7, Composite video broadcast signal connection sketch map

7.7 S-Video Signal

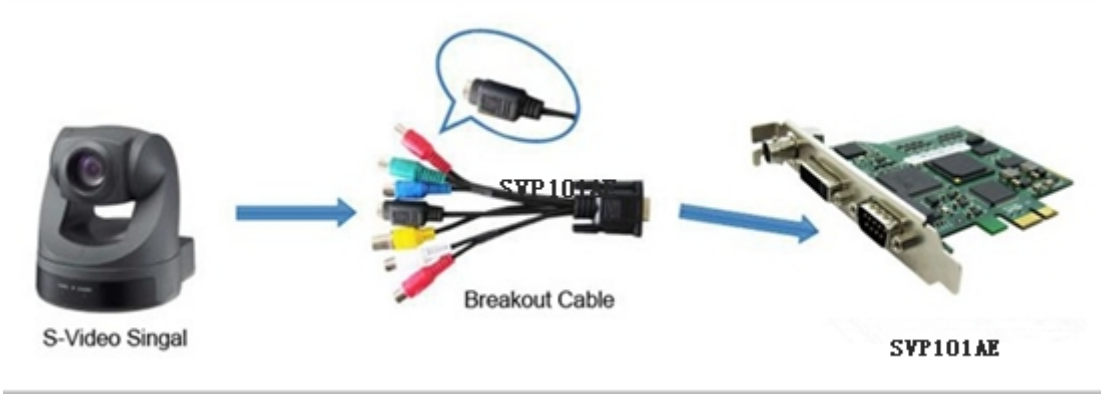


Figure 8, S-Video signal connection sketch map

8 Connection of Audio Signal

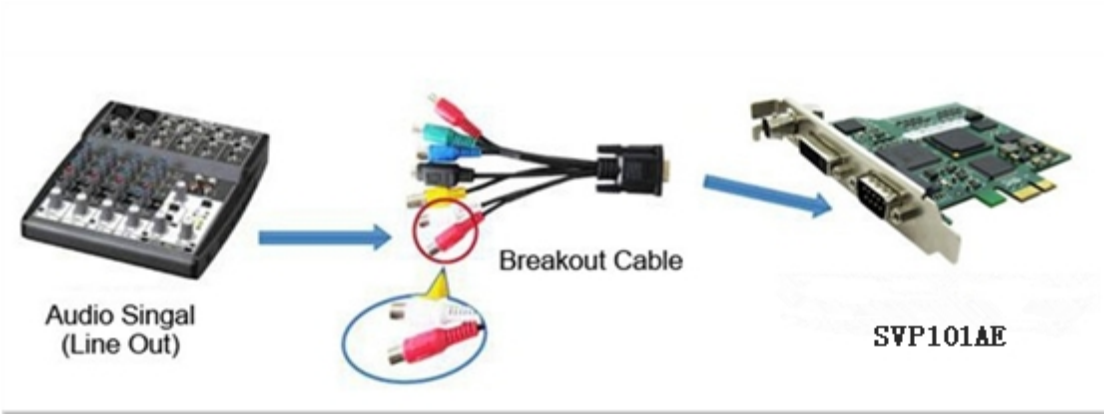


Figure 9, Audio line in signal connection sketch map

[Notes]:

The audio signal input is up to" **Line in**" level standard, if you need to connect microphone , must connect microphone with microphone input of "**microphone amplifier**" or "**mixer**" , and then "**microphone amplifier**" or " **mixer** "output is connected to the interface.

9 Video Capture Device Instruction

SVP101AE is based on Microsoft DirectShow interface, one video capture adapter will be increased in operating system after installation:

- HD Video (SVP101AE Adapter x)

SVP101AE not only offer basic options, such as image brightness, contrast, hue, saturation, Gamma and so on, but also provide additional options for setting function. You can use "**Filter Properties dialog window**" in DirectShow to set these options.

9.1 Display "Filter Properties Dialog Window" In Common Software

AMCAP: Double click "**AmCap.exe**", choose HD video device "**HD Video (SVP101AE Adapter1)**" in "**Devices**" menu, then click "**Video Capture Filter ...**" in "**Settings**" menu, pop-up " **Filter Properties dialog window**".

9.2 "Device" Instruction

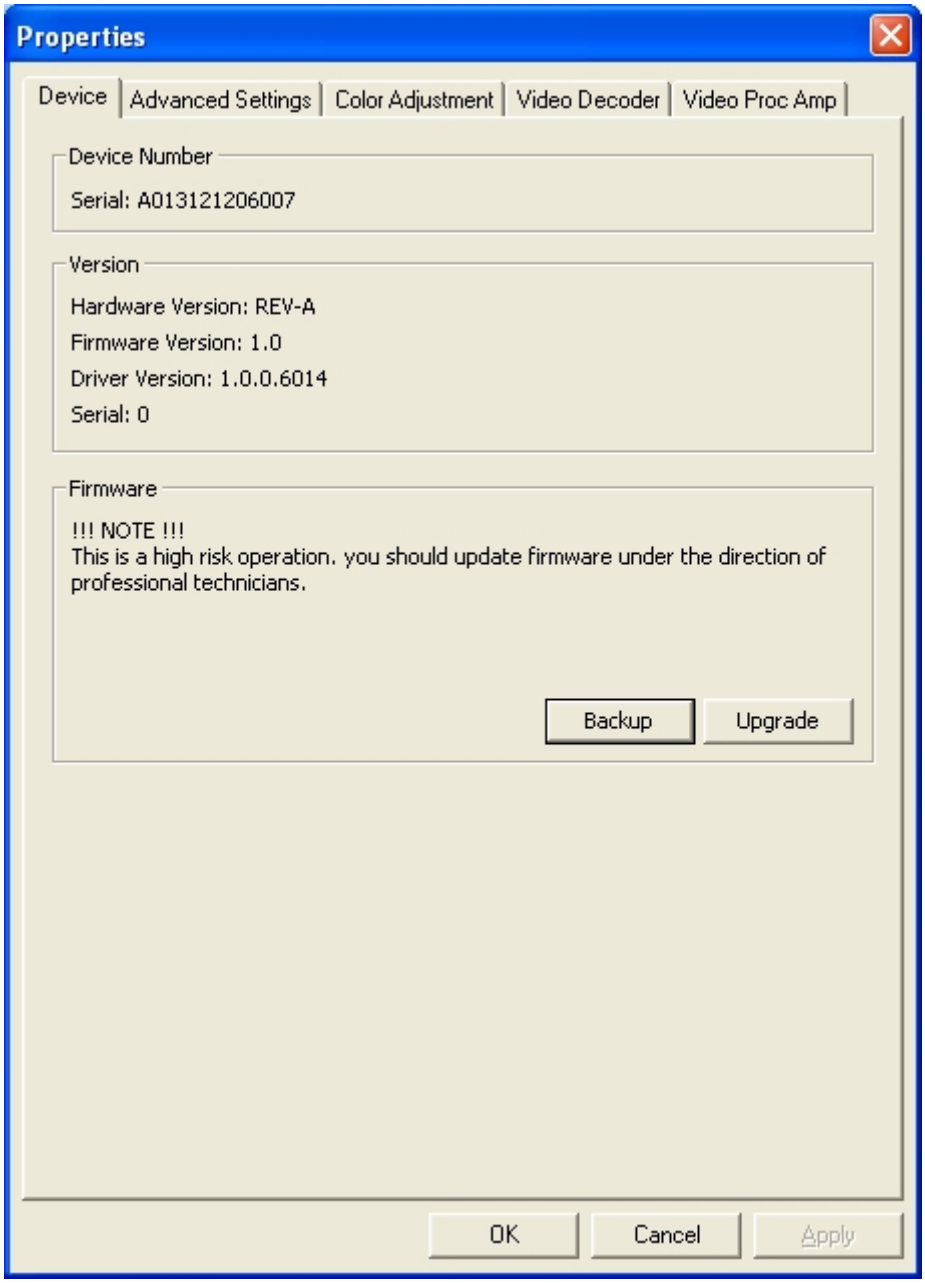


Figure 10, Device Properties tab

Device Number: display serial of card, the number should be accorded with the barcode on the card.

Version: display related version number, versions include hardware version, firmware version, driver version, and device serial. You may request user to provide relevant version number when you solve problems.

Firmware: if new features need to upgrade the firmware, we should first backup it and then upgrade the firmware.

Notes: The different versions of the firmware and hardware cannot be mixed together, or else it will get error when upgrade. Additionally, do not power outage in the process of firmware upgrade, otherwise it will lead to upgrade firmware fail, then SVP101AE will not work. You have to return SVP101AE back to factory for being repaired.

9.3 "Advanced Settings" Instruction

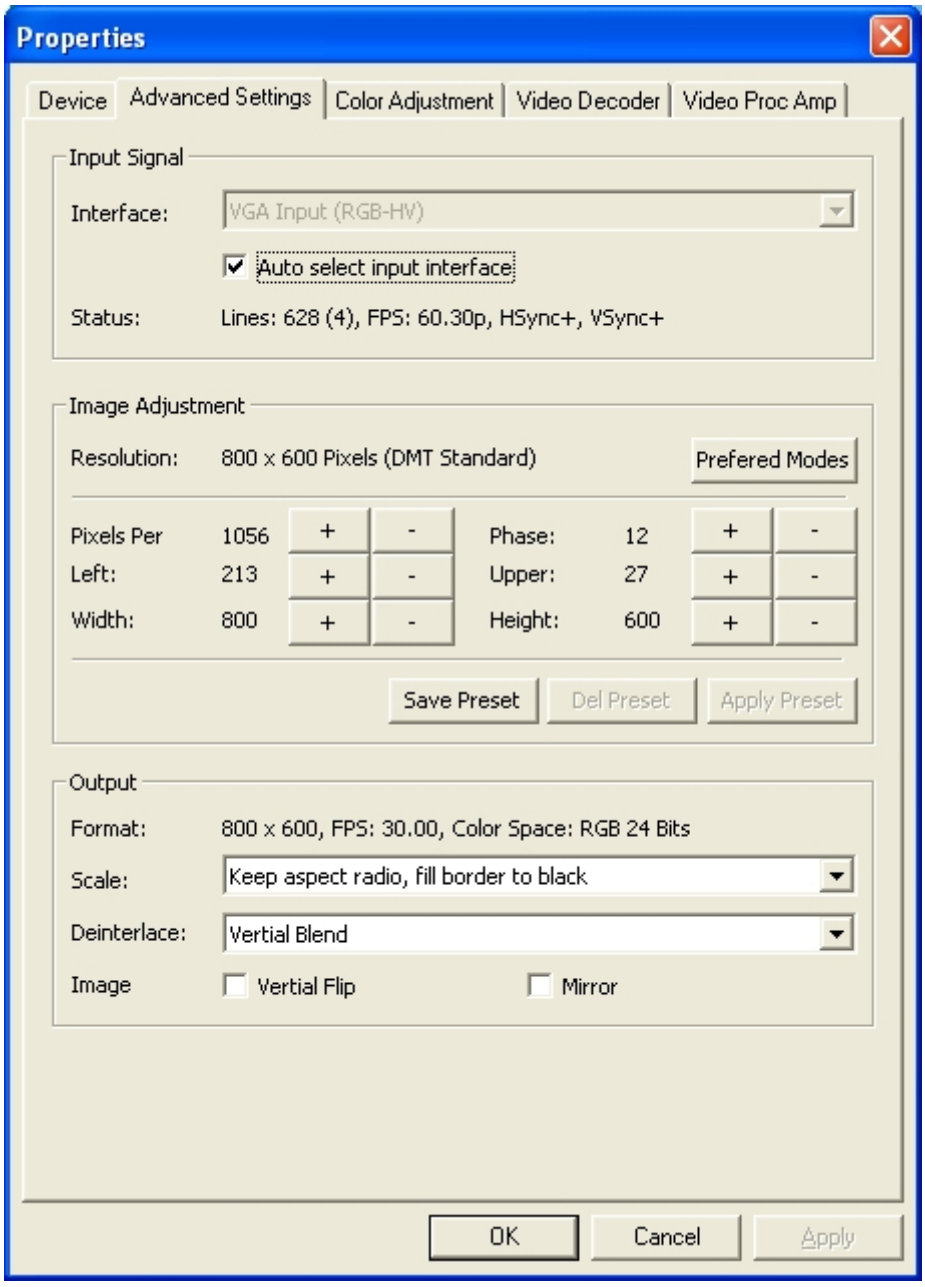


Figure 11, "Advanced Settings " page

9.3.1 Input Signal

9.3.1.1 Input Interface

By default, check "**Auto Select Input Interface**", supporting input interface includes: DVI / HDMI input, VGA input (RGB-HV), component input (Y / PbPr), composite video input (CVBS),S-Video input, SDI input（SD/HD/3G, second component input (Y / PbPr)

Notes: when "**Auto Select Input Interface**" is selected, if SDI, HDMI and Component (Y / PbPr) input interfaces have signal access, then SDI input is preferred. Composite video input (CVBS), S-Video input and second component input (Y / PbPr) must be selected manually.

9.3.1.2 Signal State

The relevant parameters of signal are shown, such as total number of rows, frame rate (p is progressive scan, i is interlaced), mode, audio frequency.

9.3.2 Image Adjustment

By default, image is auto, but auto cannot achieve desired effect, such as black border, unclear image, picture which needs clipping, it must be adjusted manually. After adjustment, you can save the preset. Then you can apply preset values without adjustment when the same signal accesses.

For example as VGA signal adjustment:

- **Black border adjustment**: Through adjust left margin and top margin to eliminate black border. Every time you can adjust 1 pixel.
- **Text clarity regulation:** adjust the line number of samples, sampling phase to achieve the desired text clarity.
- **Quickly select the correct resolution:** For the same number of lines of resolution, the capture card may not be able to identify the correct resolution, for 1024x768, 1280x768, 1360x768, 1368x768, the number of rows are all 768， automatic adjustment may all

recognition into 1024x768, then click automatic adjustment will pop up as shown in the following figure list, the user can select the correct resolution.

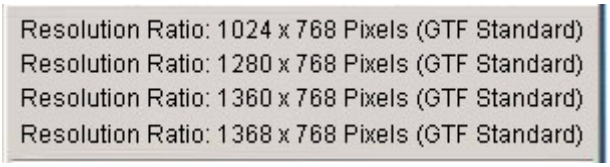

Resolution Ratio: 1024 x 768 Pixels (GTF Standard)
Resolution Ratio: 1280 x 768 Pixels (GTF Standard)
Resolution Ratio: 1360 x 768 Pixels (GTF Standard)
Resolution Ratio: 1368 x 768 Pixels (GTF Standard)

Figure 12， "Automatically adjust"menu

- **Image clipping**: Through adjust image width, height, left margin and top margin to achieve desired requirement.Increasing/reducing width of image starts from right, increasing/reducing height of image starts from below.

Skills of image clipping as follows:

1. Set scale full output image to confirm whether clipping adjustment is appropriate.
2. Cut off left margin of image: firstly increase left margin, then reduce image width.
3. Cut off right margin of image: reduce image width.
4. Cut off top margin of image: firstly reduce image height, and then increase top margin.
5. Cut off lower margin of image: reduce image height.

After image adjustment completes, click "**Save Preset**" to save current adjustment; click "**Del preset**" to delete preset you saved; click "**Apply Preset**" to apply the saved preset to current settings.

9.3.3 Image Output

Display output format of current image, set image zoom scale, deinterlace and image flipping.

- **Format:** display output image size, frame rate, color format.
- **Scale:** provide three ways, full output image and keep aspect ratio, fill border to black and keep aspect ratio, clip border.
- **Deinterlace:** disabled, vertial blend, motion adaptive(high CPU Usage)

- **Image flip:** offer two ways, vertial flip and mirror.

9.4 "Color Adjustment" Instruction

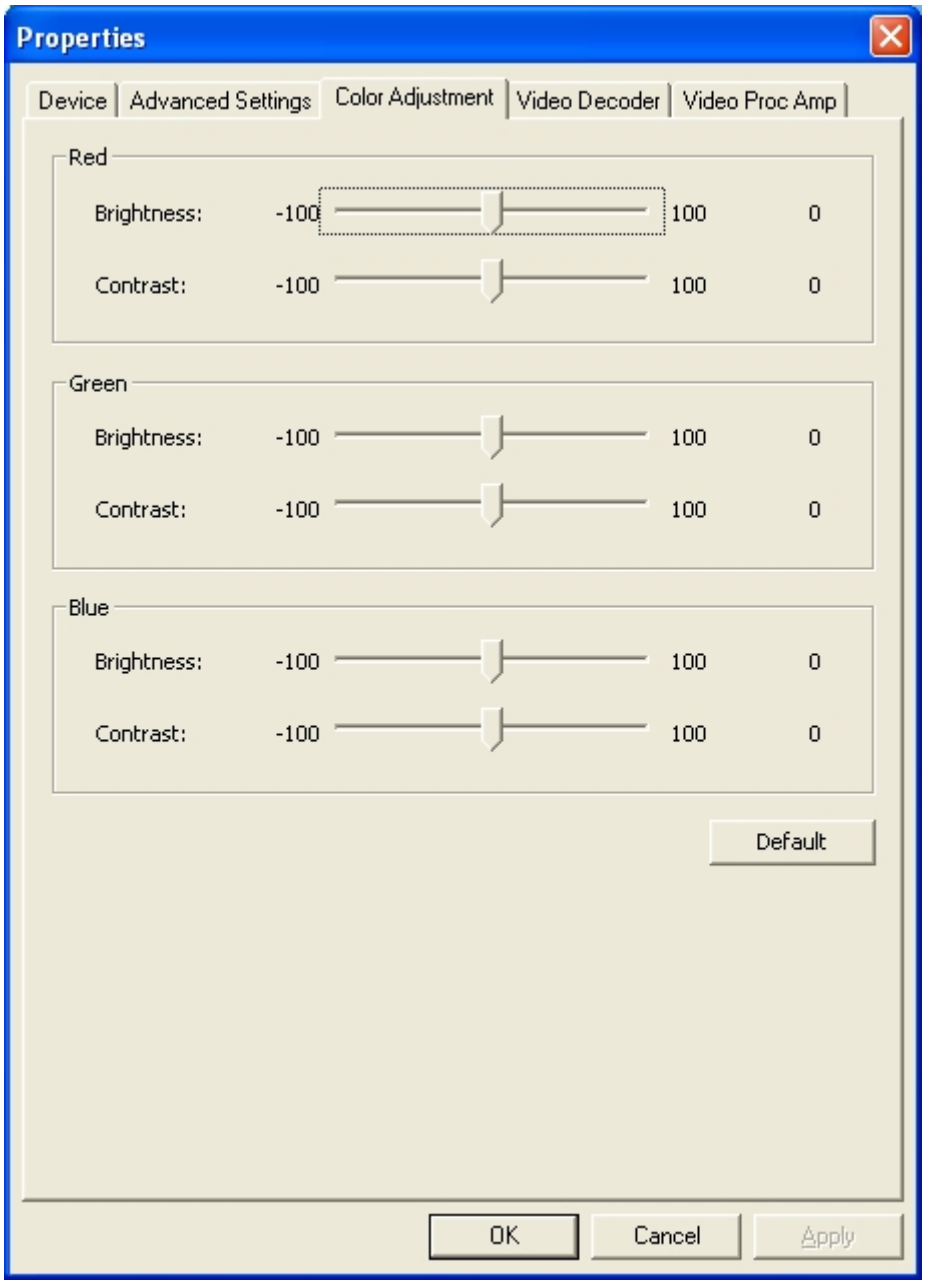


Figure 13， "Color Adjustment" properties page

Here can be adjusted R, G, B brightness and contrast separately, click "**Default**" to restore default values.

10 Video Formats Setting

Driver is redefined "**Filter Output Pin**" interface and unified standard for SD and HD. Output resolution can be any size, even special resolution which is cut.

10.1 Display "Filter Output Pin" In Common Software

- **AMCAP:** Double click "**AmCap.exe**", choose HD video device "**HD Video (SVP101AE Adapter1)**" in "**Devices**" menu, then click "**Video Capture Pin ...**"in "**Settings**" menu, pop-up " **Filter Output Pin** ".

10.2 "Out Format" Instruction

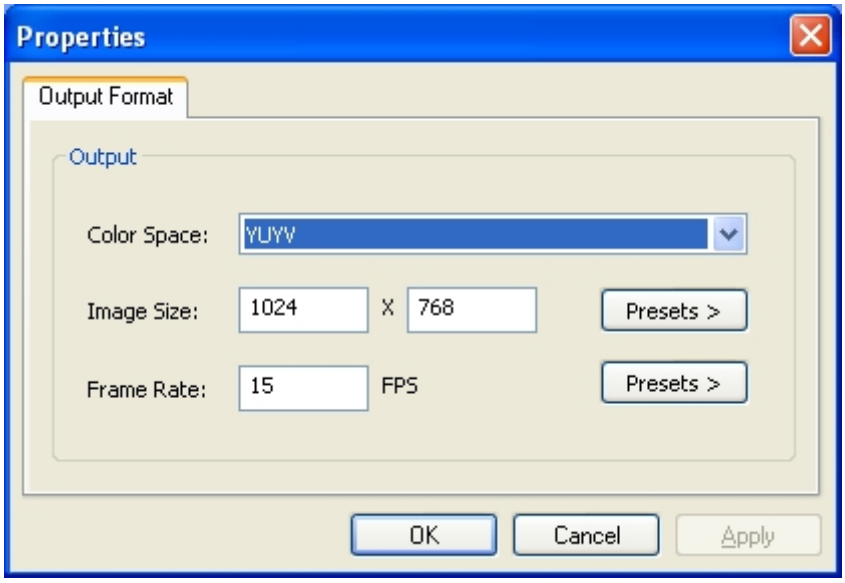


Figure 14, "Properties" page

Color Space: offer five color formats, YUYV, UYVY, I420, RGB 24 Bits, and RGB 32 Bits.

Image Size: set image size of output, it can be written manually, or select output resolution from "**Presets**", the bold font resolution at the top is the same as capture image, it is the best resolution.

Frame Rate: set output frame rate, it can be written manually, or select from "**Presets**". If application software is set output frame rate, now setting is no effect, when you open again, it will

return frame rate in application software.

11 Audio Capture Device Instruction

SVP101AE support embedded HDMI and SDI in LPCM audio, based on the Microsoft DirectShow interface. After installation in operating system, the relevant audio devices will be added on. Any software which is compatible with DirectSound, DirectShow can use the recording device for capturing sound.

11.1 Windows XP, Windows 2003

The name of audio capture device under Windows XP, Windows 2003:

- Digital In (SVP101AE Adapter x), digital audio devices, embedded SDI or HDMI audio signal.
- Line In (SVP101AE Adapter x)，analog audio equipment

Through system "**Volume Control**" to adjust recording volume, specific steps as follows:

1. In system notification icon area on right corner double-click " " button to pop-up "**Open Volume Control**" window.
2. Open "**Options**" menu, select "**Properties**" menu item.
3. In "**Mixer**", select "**Audio (**SVP101AE **Adapter x)**", click "**OK**" button.
4. Corresponding volume control project will be displayed, this time you can operate volume and "**quiet**" according to your requirement.

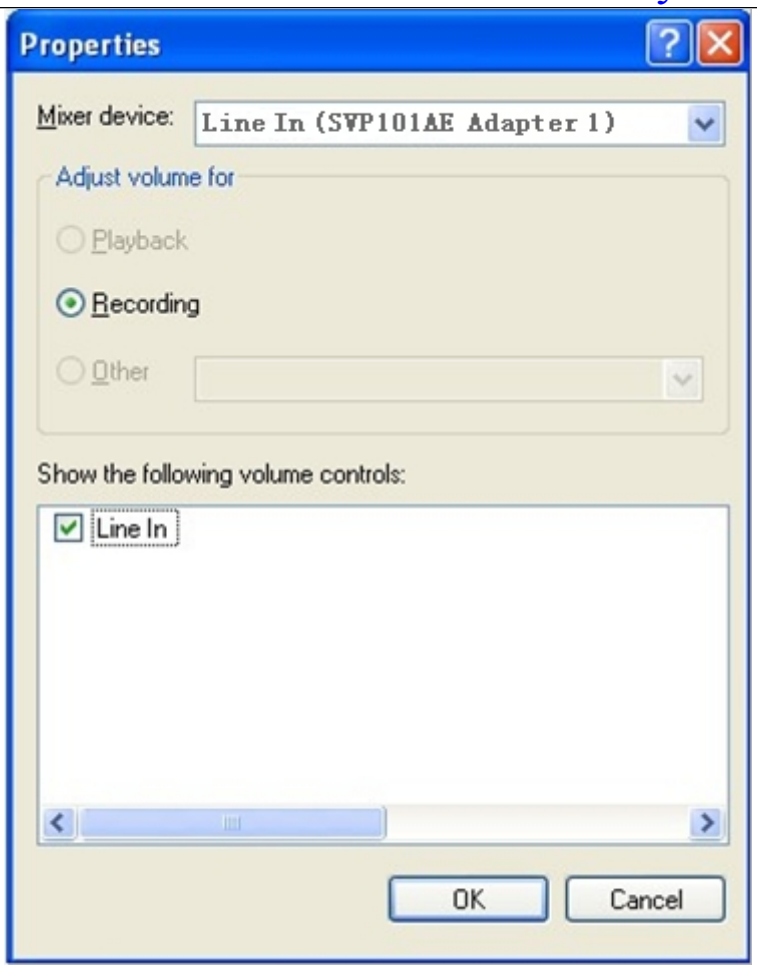


Figure 15， Windows XP/2003"VolumeControl"-"Properties" dialogue

11.2 Windows Vista, Windows 7, Windows 2008, Windows 2008 R2

Under such operating systems, each capture card will show two audio capture devices:

- Digital In (SVP101AE Adapter x), digital audio devices, embedded SDI or HDMI audio signal.
- Line In (SVP101AE Adapter x)，analog audio equipment

Through system "**Volume Control**" to adjust the recording volume, specific steps as follows:

1. In system notification icon area on right corner right-click " "button, select "**Recording devices**" in pop-up menu.
2. In pop-up list which displays recording device, select "**HDMI In**" or "**Line In**", click

"**Properties**" button, system will pop up device properties dialog window.

3. In Properties dialog box, select "**Levels**" property page, then you can operate volume control and "**Quiet**" according to your requirement.

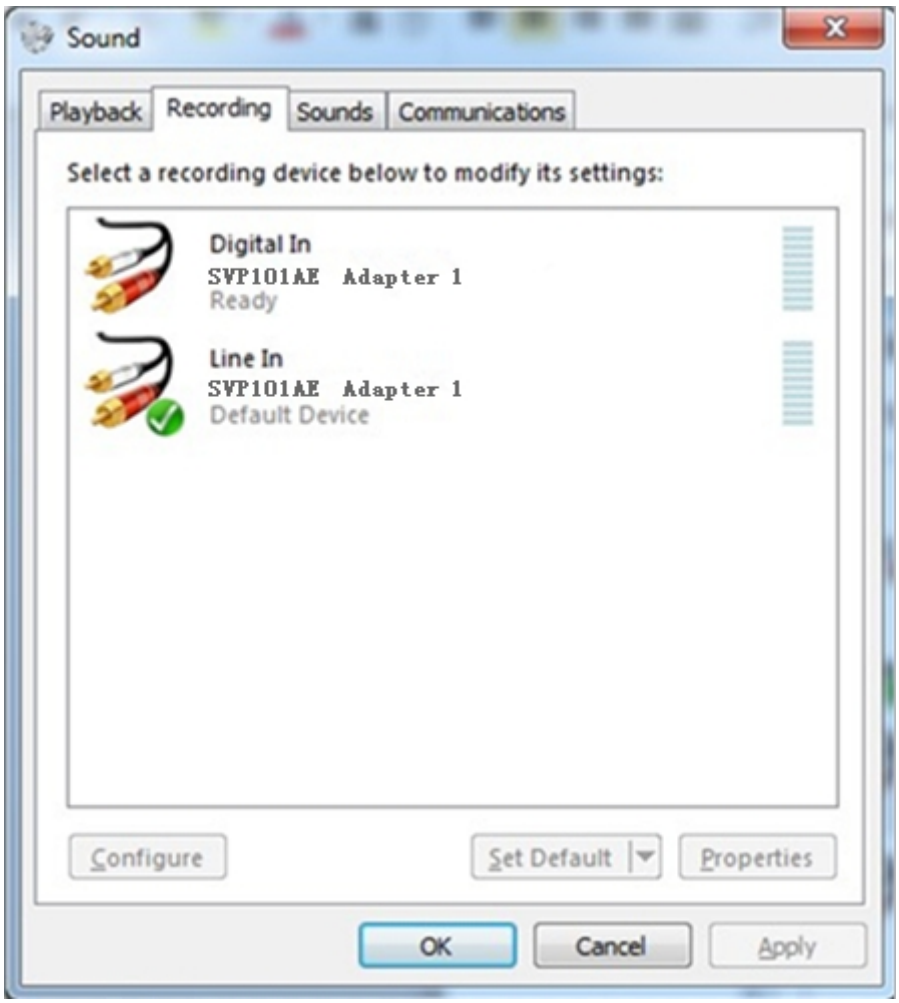


Figure 16, Windows Vista/7 recording device properties dialog windows

12 Compatible Software Instruction

SVP101AE can be compatible with variety of audio and video capture software which is based DirectShow interface, and audio capture software which is based DirectSound interface, such as:

- Windows Media Encoder
- Adobe Flash Media Live Encoder

- Real Producer Plus
- VideoLAN for Windows

Appendix

A. Related Documents

Appendix 1. Cyclone IV E components serial resources

resource	EP4CE6	EP4CE10	EP4CE15	EP4CE22	EP4CE30	EP4CE40	EP4CE55	EP4CE75	EP4CE115
Logical unit (LE)	6, 272	10, 320	15, 408	22, 320	28, 848	39, 600	55, 856	75, 408	114, 480
Embedded memory(Kbits)	270	414	504	594	594	1, 134	2, 340	2, 745	3, 888
Embedded 18*18 multiplying unit	15	23	56	66	66	116	154	200	266
Interchangeable PLL	2	2	4	4	4	4	4	4	4
Global clock networks	10	10	20	20	20	20	20	20	20
User I/O piece	8	8	8	8	8	8	8	8	8
Maximum user I/O (Note 1)	179	179	343	153	532	532	374	426	528

[Note]:

User I / O pins in pin list file include all common I / O pins, dedicated clock pins and dual- configuration pins. Transceiver pins and dedicated configuration pins are not included in the pin list.

Appendix 2. Cyclone IV E components Packaging Products

Package	E144		M164		U256		F256		U484		F484		F780	
Size(mm)	22 × 22		8 × 8		14 × 14		17 × 17		19 × 19		23 × 23		29 × 29	
Pacing(mm)	0.5		0.5		0.8		1.0		0.8		1.0		1.0	
Devices	User I/O	LVDS(Note 2)	User I/O	LVDS(Note 2)	User I/O	LVDS(Note 2)	User I/O	LVDS(Note 2)	User I/O	LVDS(Note 2)	User I/O	LVDS(Note 2)	User I/O	LVDS(Note 2)
EP4CE6	↑ 91	21	—	—	↑ 179	66	↑ 179	66	—	—	—	—	—	—
EP4CE10	91	21	—	—	179	66	179	66	—	—	—	—	—	—
EP4CE15	81	18	↕ 89	21	165	53	165	53	—	—	↑ 343	137	—	—
EP4CE22	↓ 79	17	—	—	↓ 153	52	↓ 153	52	—	—	—	—	—	—
EP4CE30	—	—	—	—	—	—	—	—	—	—	328	124	↑ 532	224
EP4CE40	—	—	—	—	—	—	—	—	↑ 328	124	328	124	532	224
EP4CE55	—	—	—	—	—	—	—	—	324	132	324	132	374	160
EP4CE75	—	—	—	—	—	—	—	—	↓ 292	110	292	110	426	178
EP4CE115	—	—	—	—	—	—	—	—	—	—	↓ 280	103	↓ 528	230

[Note]:

(1) E144 package has an exposed substrate at the bottom, the exposed substrate connect ground ,it must be connected to the PCB ground surface. Use it for for circuit connection, rather than for temperature processing purposes.

(2) that includes a dedicated LVDS pairs, including pseudo-LVDS pairs. For more information.

Appendix 3. Cyclone IV E components series of speed grade

Devices	E144	M164	U256	F256	U484	F484	F780
EP4CE6	C8L, C9L, I8L C6, C7, C8, I7, A7	—	I7N	C8L, C9L, I8L C6, C7, C8, I7, A7	—	—	—
EP4CE10	C8L, C9L, I8L C6, C7, C8, I7, A7	—	I7N	C8L, C9L, I8L C6, C7, C8, I7, A7	—	—	—
EP4CE15	C8L, C9L, I8L C6, C7, C8, I7	I7N	I7N	C8L, C9L, I8L C6, C7, C8, I7, A7	—	C8L, C9L, I8L C6, C7, C8, I7, A7	—
EP4CE22	C8L, C9L, I8L C6, C7, C8, I7, A7	—	I7N	C8L, C9L, I8L C6, C7, C8, I7, A7	—	—	—
EP4CE30	—	—	—	—	—	C8L, C9L, I8L C6, C7, C8, I7, A7	C8L, C9L, I8L C6, C7, C8, I7
EP4CE40	—	—	—	—	I7N	C8L, C9L, I8L C6, C7, C8, I7, A7	C8L, C9L, I8L C6, C7, C8, I7
EP4CE55	—	—	—	—	I7N	C8L, C9L, I8L C6, C7, C8, I7	C8L, C9L, I8L C6, C7, C8, I7
EP4CE75	—	—	—	—	I7N	C8L, C9L, I8L C6, C7, C8, I7	C8L, C9L, I8L C6, C7, C8, I7
EP4CE115	—	—	—	—	—	C8L, C9L, I8L C7, C8, I7	C8L, C9L, I8L C7, C8, I7

[Note]:

(1) C8L, C9L and I8L speed grade for 1.0 V core voltage.

(2) C6, C7, C8, I7, and A7 speed grades for 1.2 V core voltage.

Appendix 4. Cyclone IV components series of M9K module data width

Model	Date width settle
Single-port or simple Dual-port	×1, ×2, ×4, ×8/9, ×16/18, 和 ×32/36
True Dual-port	×1, ×2, ×4, ×8/9, 和 ×16/18

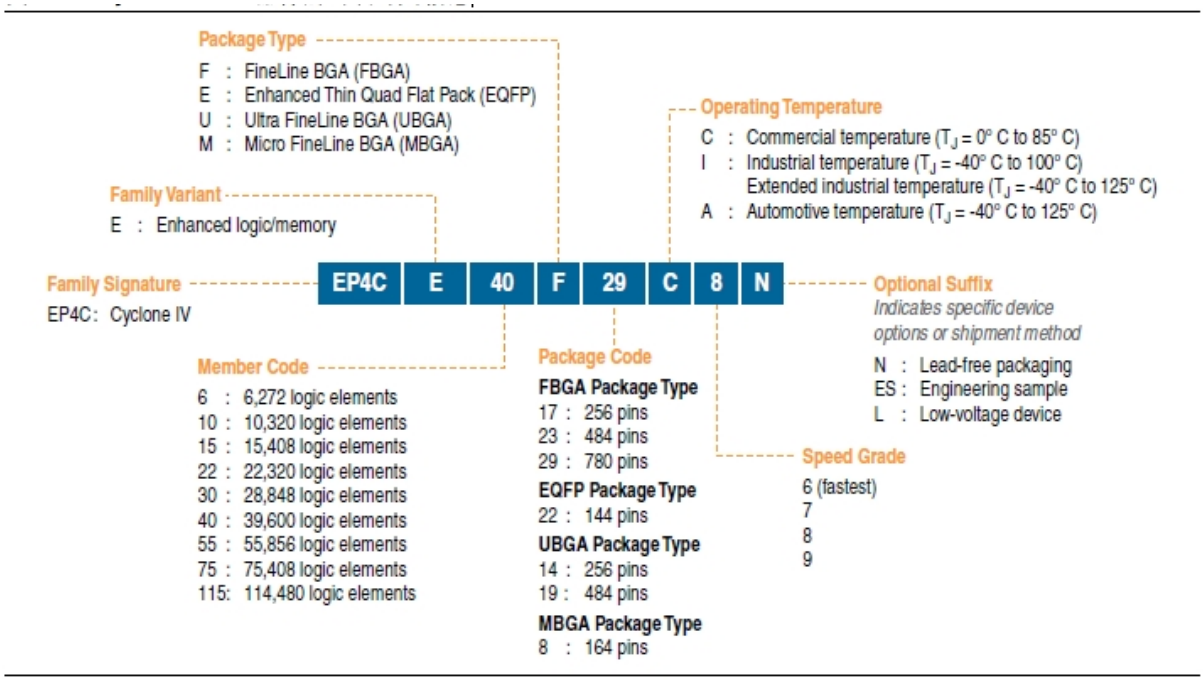
Appendix 5. Cyclone IV components series support I/O standard

Model	I/O standard
Single-port I/O	LVTTL, LVCMOS, SSTL, HSTL, PCI, 和 PCI-X
Differential I/O	SSTL, HSTL, LVPECL, BLVDS, LVDS, mini-LVDS, RSDS, and PPDS

Appendix 6. Cyclone IV components serial configuration solution

Devices	Supported configuration solution
Cyclone IV GX	AS, PS, JTAG, and FPP (Note 1)
Cyclone IV E	AS, AP, PS, FPP, and JTAG

Appendix 7. Cyclone IV components package products information


Package Type
F : FineLine BGA (FBGA)
E : Enhanced Thin Quad Flat Pack (EQFP)
U : Ultra FineLine BGA (UBGA)
M : Micro FineLine BGA (MBGA)
Operating Temperature
C : Commercial temperature (TJ = 0° C to 85° C)
I : Industrial temperature (TJ = -40° C to 100° C)
Extended industrial temperature (TJ = -40° C to 125° C)
A : Automotive temperature (TJ = -40° C to 125° C)
Family Variant
E : Enhanced logic/memory
Family Signature
EP4C: Cyclone IV
EP4C E 40 F 29 C 8 N
Optional Suffix
Indicates specific device options or shipment method
N : Lead-free packaging
ES : Engineering sample
L : Low-voltage device
Member Code
6 : 6,272 logic elements
10 : 10,320 logic elements
15 : 15,408 logic elements
22 : 22,320 logic elements
30 : 28,848 logic elements
40 : 39,600 logic elements
55 : 55,856 logic elements
75 : 75,408 logic elements
115: 114,480 logic elements
Package Code
FBGA Package Type
17 : 256 pins
23 : 484 pins
29 : 780 pins
EQFP Package Type
22 : 144 pins
UBGA Package Type
14 : 256 pins
19 : 484 pins
MBGA Package Type
8 : 164 pins
Speed Grade
6 (fastest)
7
8
9

B. Terms and Abbreviations

Abbreviation	Description
HDMI	High-Definition Multimedia Interface
YPbPr	Component Video Connector
CVBS	Composite Video Broadcast Signal
SDI	Serial Digital Interface
VGA	Video Graphics Array
DVI	Digital Visual Interface

C. Safety Caution

In the process of use or repair any equipment by SYSTECH need to pay attention to the following safe guard. Terminal equipment shall inform the security of user information below. Otherwise, SYSTECH technology will not bear any because the user did not press these warnings and consequences.

Contact us:

SYSTECH
Address: 702, Block A, Tsinghua Hi-Tech Park, Nanshan, Shenzhen, China
Tel: 400-993-9390
Fax: 86-755-2603 0411
Post code: 518057
www.sysembed.com